HIGH SCHOOL AND UNIVERSITY
MATRICULATION EXAMINATIONS BOARD.

DEPARTMENTAL EXAMINATIONS, 1928

TRIGONOMETRY 1.

Time—Three hours.

Values.

1. Attempt *two* parts only:

6 (*a*) If Sin $A=\frac{1}{2}\sqrt{3}$, Cos $B=-0.6789$ and Cot $C=4.567$ find the values to the nearest minute of A, B and C.

6 (*b*) If Sin $\theta=.5$ find the value of $1+\tan^2\theta$.

6 (*c*) Find by the use of a figure the value of:

$$\text{Sin } 210^\circ\text{; Cos }(-225^\circ)\text{; Sec}\frac{5\pi}{6}\text{; Tan}\left(-\frac{3\pi}{4}\right).$$

9 **2.** (*a*) Establish geometrically the formula for the Cosine of the sum of two angles.

8 (*b*) Obtain formulae for expressing the following: Tan $(A+B)$; Sin $A-$Sin B.

3. Prove any *two* of the following identities:

8 (*a*) $$\frac{1-\text{Tan}^2\theta}{1+\text{Tan}^2\theta}=\text{Cos } 2\theta.$$

8 (*b*) $$\text{Sec } A+\text{Tan } A=\frac{1+\text{Tan}\,\frac{1}{2}A}{1-\text{Tan}\,\frac{1}{2}A}$$

8 (*c*) $$\frac{\text{Sin } 2A+\text{Sin } 2B+\text{Sin } 2C}{\text{Sin } 2A+\text{Sin } 2B-\text{Sin } 2C}=\text{Tan } A\,.\,\text{Tan } B$$
where A, B, C are the angles of a triangle.

4. Attempt *two* parts only:

7 (*a*) The perpendicular from the vertex of a triangle on the base is 6 in. long and divides the base into segments which are 2 in. and 3 in. respectively. Find the tangent of the vertical angle.

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Values.

7 (*b*) If $\text{Cos } 2A = \frac{2}{3}$ prove that $\text{Tan } A = \frac{\sqrt{5}}{5}$

7 (*c*) Prove $\text{Sin } 33° + \text{Cos } 63° = \text{Cos } 3°$.

7 **5.** *Either* Prove that the rectangle contained by the diameters of the circumscribed and inscribed circles of a triangle is equal to $\frac{2abc}{a+b+c}$ where a, b and c are the sides of the triangle.

Or Prove that the area of a triangle $= \frac{a^2 \text{ Sin } B \; . \; \text{Sin } C}{2 \text{ Sin } (B+C)}$

10 **6.** The angle of elevation of the top of a hill viewed from a certain point is 29° 17′, and from a point 362.4 ft. nearer, measured directly towards the hill, the angle of elevation is 48° 12′. Find the height of the hill.

13 **7.** A point B is invisible and inaccessible from A, and it is necessary to find its distance from A. To do this a straight line is run from A to P and continued to Q such that B is visible from P and Q. The following measurements are then taken: $AP = 2487$ feet; $PQ = 2256$ feet; $\angle APB = 142° \, 38' \, 20''$ and $\angle AQB = 76° \, 13' \, 45''$. Find the distance from A to B.

11 **8.** In a system of triangulation the sides of a triangle connecting the stations on the tops of three hills have been computed and have been found to be 45,726 ft., 57,692 ft. and 64,284 ft. respectively. What are the values of the angles of this triangle as computed from the sides?

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